

Multi-tiered Vegetation Mapping

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Matching Multiple User Requirements to Map Requirements

Problem:

The development of data about natural resources, such as maps of vegetation communities, is a necessary and important activity at military installations. Trainers need this information to be able to carry out and sustain their mission, and land managers need these data to be able to sustain and protect the land and water resources. These users, and potentially many more, represent many levels, or tiers, of users who need vegetation maps to make decisions important to the installation mission. Each of these users requires that the final map be able to meet their needs for vegetation information, be it concealment patterns and avenues of approach for training simulation, habitat composition and patterns for managed animal species, or as a basic data layer for programs and models designed to manage and sustain the land.

Balancing multiple levels of users and their map requirements to produce a useful and economical vegetation map poses a difficult task for installation land managers. It may be difficult to articulate a single user's requirements and harder yet to resolve multiple user requirements, which may pull in different directions. User requirements need to be matched to map requirements including:

- Map detail and resolution
- · Final map format classification categories
- Available resources
- Time, level of effort, and area of coverage
- Data types and technical approach

The usual intent of a vegetation map is to supply an inventory of plant communities including their location, extent, geographical distribution in the landscape, relationship to other landscape features, and a description of selected characteristics. With the growth of computing techniques and advances in remote sensing, modeling, and sampling theory, a vegetation map can now possess a great deal of sophistication. Further, map information is no longer valuable to a only a few, but can be shared, manipulated, and presented to serve many different clients, each with their own requirements for map detail, resolution, and information. Because of the importance of maps, satisfaction with the product is critical. The individuals who will be using the maps must be proactive in defining the uses of the maps and their associated databases.

In addition to resolving key decision variables for a map such as scale, resolution, data sources, area of coverage, and map information, managers must be able to understand and incorporate the Federal Geographic Data Committee's National Vegetation Classification Standard (NVCS) into their mapping project. At issue is how to apply the national data standard in a way that allows the local map classification scheme to fit into the national standard. The NVCS supports ecosystem management and regional and national resource assessment.

Categories of Users and Examples of Activities or Applications of Vegetation Information

Mission Concerns

- Observation, concealment, cover, avenues of approach
- Training realism
- Limited access and siting considerations

Land Management

- ·Soil erosion & water quality
- Impact assessment
- Buffers and corridors
- Carrying capacity and land sustainability
- Restoration and remediation

Vegetation Management

- Forest harvest and condition
- Range/grasslands condition
- Wetland surveys
- •Fire management
- LCTA plots

Fish and Wildlife

- Population inventory
- Habitat assessment
- Biological diversity

Pest Management

- Noxious plants and animals
- Inventory and trends
- Control and monitoring

TES Species

- Population inventory and monitoring
- Habitat assessment and management
- Management of individuals

Cultural Resources

- Survey of sites and resources
- Interpretation of findings
- Prediction of impacts

Public Relations

- Environmental awareness and education
- Noise management

Safety and Emergency

- Hazard area screening
- Jump zone characterization
- Poisonous plant ID
- •Routes of access

Planning

- ◆NEPA documentation
- INRMPs
- Installation master planning
- Ecosystem management and restoration, biodiversity protection

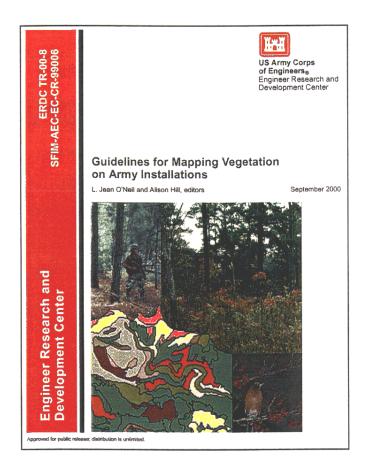
Excerpted from Table 2.A-1 of the Guidelines for Mapping Vegetation on Army Installations

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Multi-tiered Vegetation Mapping

Approach:

Multi-tiered vegetation mapping is an effort by the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC), sponsored by the Army Environmental Center, that defines an approach and a set of tools used to develop economical vegetation maps for multiple installation users. It focuses on the map development process as a decision framework that must be addressed by the project manager to ensure a successful resulting map. The framework is described in a document produced by ERDC entitled *Guidelines for Mapping Vegetation on Army Installations*.

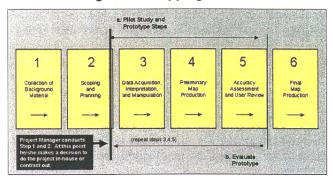


Mapping Process

The *Guidelines* document provides a useful framework for completing vegetation maps and is an especially valuable tool for installation land managers who do not have previous vegetation mapping experience. The *Guidelines* begin with a scoping and planning phase, the most critical phase of any mapping project. It sets the tone, goals, and approach for the entire projectand identifies possible tradeoffs and solutions to problems

that may be encountered. At this point, the project manager must decide whether to conduct the project in-house or contract out certain activities. Subsequent steps in the process guide the project manager through data acquisition and pilot project phases before embarking on full-scale final map development.

Vegetation Mapping Process



This process addresses six major questions that need to be made in any mapping project:

- 1. What are the goals and objectives of the project?
- 2. What will be the form and format of the products?
- 3. How much and what work will be contracted?
- 4. Which mapping approach and data standards should be used?
- 5. Will tradeoffs of user needs and resources be necessary?
- 6. Will the final product meet the specifications of the users?

By following the *Guidelines'* process, all six questions can be addressed. This helps to focus the project, identify milestones, and assist in making process decisions.

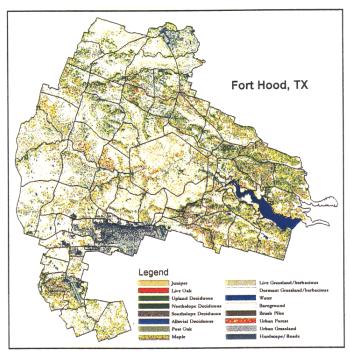
Solution:

Fort Hood, Texas Vegetation Map

The applicability and usefulness of the *Guidelines* document and its vegetation mapping process was demonstrated at Fort Hood, Texas as a part of the Corps of Engineers Land Management System (LMS). A vegetation map was developed using the *Guidelines* as a model for five user groups including the training program, threatened and endangered species management, plant succession modeling, carrying capacity modeling, and the soil erosion program. The resultant map covered 220,000 acres of vegetation and contained 11 vegetation classes and 5 additional classes for windrows, hardscape, and urban areas. The overall map accuracy was 81%.

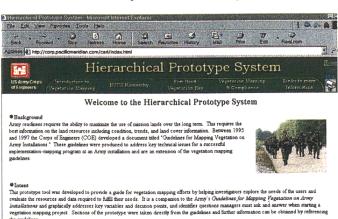
Multi-tiered Vegetation Mapping

Fort Hood Vegetation Map



Hierarchy Tool

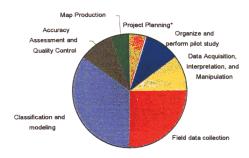
In addition to the mapping process, the multi-tiered vegetation mapping effort developed several additional tools to aid installation land managers in their development of useful vegetation maps. The hierarchy tool assists in understanding the NVCS and how this standard should be applied to each mapping project. It is a web-based system that explains how the NVCS is constructed and how a user should apply the standard. In addition, it provides an explanation of what vegetation maps look like at each level of the NVCS hierarchy and how mapped vegetation at each level can provide answers to questions by users.



Vegetation Mapping Cost Tracking and Analysis

The selection of mapping parameters has a direct effect on the cost of different mapping activities. Since the combination of these parameters influences the total cost to complete a mapping project, it is imperative that they be identified during the project planning phase.

Resource Consumption by Activity



As shown in the figure above, certain relationships that drive the cost of mapping projects can be identified, quantified, and modeled. With a large database of cost data, project managers could use this information to estimate project costs for each activity based on resource costs and mapping parameters. They could also conduct "what-if" analyses to quantify the tradeoffs between project costs and mapping parameters that may be affected by management decisions. This is another way in which the project manager can ensure that the final map meets the needs of the end users. The tracking sheet below allows the manager to itemize and document activity costs by job class.

Tasks	bays	#People	Expertise Required	Total Cost	N/A
Collection of Exitating Information				E S S S S S S	
Reference Material (Literature Review)					
Collection Material from AOI					
Existing Data					
Digital and hard copy maps					
Collect imagery and photography of AOI					
Consultation with Experts					
Information gathering and team development					
Identify needs (equipment, personnel, etc)					
Scoping and Planning			The second	STATE OF	
Synthesis of literature and background material					
Establish Objectives					
Develop and review SOW					
Determine available resources (personnel, equipment, etc.)					
Determine specifications and costs					
Hold a planning meeting					
Finalize Specifications (mapping parameters)					
Develop and review POW					
Preparation for mapping					
Plan accuracy assessment					
Review Federal Standards					
Evaluate options for obtaining reference data					
Establish criteria and priorities					
Evaluate tradeoffs btwn. existing sources and new data			-		
Establish protocols for collection reference data					
Determine number of samples and sample placement					



Multi-tiered Vegetation Mapping

For information about the Guidelines for Mapping Vegetation on Army Installations:

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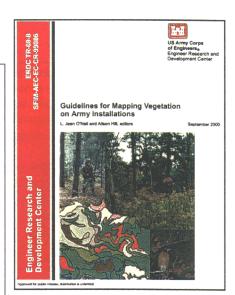
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For information about:

- Vegetation Map demonstration project at Fort Hood, Texas
- Hierarchy Tool
- Vegetation Mapping Cost Analysis and Tracking



Contact:

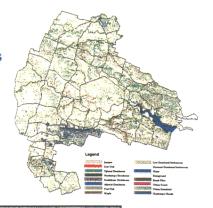
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Teles	Days	Plampia		Total Cost	NA
Collection of Exitating Information	75000E				26
Reference Meterial (Literature Review)					
Collection Material from AQE					
Existing Date					
Digital and hard copy maps					
Collect imagery and photography of AOI					
Consultation with Experts					
Information gathering and team development					
Identify needs (equipment, personnel, etc)					
Scoping and Floraing	SEP. 200	SESSESSES.	新疆路路 建安水	中的放射	40,93
Synthesis of literature and background material					
Establish Objectives					
Develop and review SOW					
Determine available resources (personne), equipment, etc.)					
Determine specifications and costs					
Hold a planning meeting					
Finalize Specifications (mapping parameters)					
Develop and review POW					
Preparation for mapping					
Plen accuracy assessment					
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Establish criteria and priorities					
Evaluate tradeoffs bown, existing sources and new data					
Establish protocols for collection reference date					
Determine number of samples and sample placement					